Association Between Parental Supply of Alcohol and Later Adolescent Alcohol Use in a Highly Permissive Context

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ABSTRACT. **Objective:** Many children and adolescents get their first experience with alcohol in a family setting. Evidence suggests that parental supply of alcohol is a risk factor for drinking later in life. However, most of the previous studies have been conducted in Western countries. The Czech Republic has among the highest alcohol consumption per capita, including among adolescents, and providing their own children with sips of alcohol is widely considered by parents to be a good way to introduce children to safe drinking. This study examined whether the parental supply of alcohol is associated with later use among adolescents in an Eastern European alcohol-permissive context. **Method:** The sample included children (49% female) assessed at age 11 ($n = 2,202$) and age 15 ($n = 1,279$) from the European Longitudinal Study of Parents and Children (ELSPAC). The outcome was adolescent alcohol use at age 15, reported by adolescents and pediatricians. Predictors included different sources of alcohol (parents, family member, friend, own supply, or other sources) reported by adolescent at age 11. **Results:** Parental supply of alcohol consistently emerged as a robust longitudinal predictor of adolescent alcohol use, with adjusted odds ratios of self-reported and pediatrician-reported frequent drinking at age 15 of 2.34 [1.19, 4.44] and 2.37 [1.02, 5.47], respectively. It also mediated the association between parental drinking and adolescent alcohol use. **Conclusions:** Parental supply of alcohol is an important risk factor for later adolescent alcohol use in the high alcohol-permissive population of the Czech Republic, suggesting that the association might not be context dependent. (*J. Stud. Alcohol Drugs, 84,* 27–36, 2023)

Alcohol consumption is associated with a significant burden of disease worldwide (Shield et al., 2020), particularly in adolescents and young adults (Gore et al., 2011; Shield et al., 2020). A considerable number of children and adolescents get their first experience with alcohol in a family setting (Jongenelis et al., 2018; Ward & Snow, 2011). Parents provide alcohol to adolescents mostly out of the belief that giving them a controlled amount of alcohol in a supervised environment is a safe way to expose them to alcohol and to prevent them from obtaining alcohol from other sources (Jackson et al., 2012; Wadolowski et al., 2016).

However, previous studies have found that parental supply of alcohol was a risk factor for later drinking rather than a protective one (Aiken et al., 2020; Clare et al., 2020; Colder et al., 2018; Komro et al., 2007; Mattick et al., 2018; Sharmin et al., 2017). Specifically, parental alcohol supply has been linked to an increased frequency and quantity of drinking (Colder et al., 2018; Komro et al., 2007; Mattick et al., 2018), higher levels of binge drinking (Aiken et al., 2020; Clare et al., 2020), and greater intentions to drink (Komro et al., 2007). Some studies found that adolescents who obtained alcohol from their parents reported less alcohol-related harm than those who received it from their peers (Wilson et al., 2018). Yet, parental supply of alcohol was also associated with increased odds of adolescents subsequently obtaining alcohol from other sources (Boland et al., 2020; van der Vorst et al., 2010). Parental supply may thus contribute to the problem it was intended to prevent.

The findings of previous studies have suggested that the effect of parental alcohol supply on subsequent adolescent drinking may be partially dependent on the context in which alcohol is supplied and on the offered amount (sips vs. whole drinks). For example, Aiken and colleagues (2020) reported that adolescents supplied with sips were less likely to report later binge drinking and alcohol-related harms than those supplied with whole drinks. However, adolescents supplied with sips were still more likely to report both adverse outcomes than adolescents who did not receive any alcohol from parents. Consistently, the association between parental alcohol supply and adolescent drinking was found regardless of whether the exposure was conceptualized as offers of alcohol (Danielsson et al., 2011), drinking permitted (Colder et al., 2018), or supervised by parents (McMorris et al., 2011), drinking at home (van der Vorst et al., 2010), or at family gatherings (Warner & White, 2003).

Most studies on parental supply of alcohol have been conducted in North America, Australia, and Western Europe. It is unclear whether the parental supply of alcohol is similarly associated with future alcohol use in adolescents across countries with varying degrees of permissiveness toward alcohol use (McMorris et al., 2011). As emphasized in the recent meta-analysis, studies from cultures with traditionally low restrictions on youth drinking are particularly needed (Sharmin et al., 2017). The Czech Republic is among the leading countries in alcohol consumption per capita in the world (Czech Statistical Office, 2020). Drinking is considered a normative part of the culture, which is reflected in permissive attitudes toward alcohol, its widespread availability, and a belief that parents providing their own children with sips of alcohol is a good way to introduce them to safe drinking (Dzúrová et al., 2010; Hodačová et al., 2017).

Availability and supply of alcohol at home may serve as a norm setting that affects drinking behavior in adolescents (Nash et al., 2005; van der Vorst et al., 2006; Van Zundert et al., 2006). Parental alcohol use has indeed been associated with alcohol use in offspring (Rossow et al., 2016). One of the important factors explaining this association may be normalizing alcohol use, particularly if it is coupled with socializing adolescents to drinking by offering them an opportunity to consume alcohol (Kaynak et al., 2014). Thus, supplying alcohol to adolescents may serve as a mediator between parental and adolescent alcohol use, because offering alcohol conveys a norm that drinking is acceptable and approved behavior. Setting this norm may subsequently encourage adolescent drinking (Wadolowski et al., 2016).

To the best of our knowledge, no study has examined the parental supply of alcohol to adolescents in countries of Central and Eastern Europe, where permissiveness toward alcohol and its consumption are typically high (Dzúrová et al., 2010; Shield et al., 2020). Our study used a longitudinal sample of Czech adolescents to examine whether parental supply of alcohol would be positively associated with alcohol use among adolescents within an Eastern European alcohol-permissive context. Specifically, we investigated (a) whether parental alcohol supply at age 11 was prospectively associated with the frequency of alcohol use in middle adolescence (age 15), (b) whether parental supply of alcohol mediated the association between parental and adolescent alcohol use, and (c) the relative contribution of parental supply of alcohol to subsequent adolescent alcohol use compared with other sources of alcohol supply.

Method

Study population and study sample

The data came from the Czech part of the European Longitudinal Study of Pregnancy and Childhood (ELSPAC), a population-based prospective longitudinal birth cohort study in six countries (Golding, 1989). Pregnant women living in the Brno region or Znojmo district with expected delivery between March 1, 1991, and June 30, 1992, were initially enrolled. Information from 5,151 mothers and their newborns was available at baseline (Piler et al., 2017). Subsequently, parents completed questionnaires on health, lifestyle, dietary habits, demographics, psychosocial factors, and environmental exposure about themselves and their child at 6 and 18 months after birth and then when children were 3, 5, 7, 11, 15, 18, and 19 years old. From the age of 11, children started providing self-reports in addition to their mothers and other reporters at the same age. Information on children was completed with medical records from pediatricians.

Given the long course of the study, there was attrition in the sample, especially as children started primary school. The analytic sample in the current study included 2,202 adolescents who provided valid responses for the item asking about sources of alcohol supply at age 11. This subsample did not significantly differ from the full sample in family structure, mother's alcohol use at age 11, or father's alcohol use at age 11. There were slightly more girls in the subsample (50.2% vs. 47.2%), $\chi^2(1) = 4.28$, $p = .039$. Mother's education was higher in the subsample compared with the rest of the original sample, $\chi^2(5) = 110.41$, $p < .001$. At age 15, there were 1,264 adolescent reports and 747 pediatrician reports available.

Measures

Outcomes.
(A) ADOLESCENT REPORT OF ALCOHOL USE (15 YEARS): This was the first assessment where adolescents were asked to report on their alcohol use with the following response options: 0 = *never,* 1 = *used once in a lifetime,* 2 = *used more than once in a lifetime,* 3 = *use often.* For the analysis, categories "never" and "once in a lifetime" were merged, resulting in a new variable coded as 0 = *used never/once,* 1 = *used more than once,* 2 = *use often.*

(B) PEDIATRICIAN REPORT OF ADOLESCENT ALCOHOL USE (15 YEARS): The pediatrician data were based on the medical documentation for the adolescent, which included the history of all medical examinations of the adolescent. Using this, the pediatricians filled out the study questionnaires. First, they reported whether adolescents used alcohol (*yes* or *no*). If they answered yes, this was followed with a question about frequency: 1 = *a glass of beer or wine not more than once a month,* 2 = *a larger dose not more than once a month,* 3 = *a glass of beer or wine more than once a month,* 4 = *a larger dose more than once a month.* Categories 1+2 and 3+4 were combined, resulting in a new variable coded as 0 = *no use,* 1 = *infrequent use,* 2 = *frequent use.*

Sources of alcohol supply. At age 11, adolescents were asked to report whether they ever used alcohol and then to respond to the question "Who offered you alcohol (whether

you tried it or not)" by choosing one option from a list: 1 = *stranger,* 2 = *friend,* 3 = *someone in school,* 4 = *mom or dad,* 5 = *someone else in the family,* 6 = *obtained it myself,* 7 = *no one offered me alcohol.* Because of very low endorsements for *stranger* and *someone in school,* we merged these categories into a new category called *other source of alcohol.*

Covariates.

(A) Sᴇx: Mother-reported sex of the adolescents was coded as 0 = *male,* 1 = *female.*

(B) Mᴀᴛᴇʀɴᴀʟ ᴇᴅᴜᴄᴀᴛɪᴏɴ: The highest attained education of the mother was coded in years of education completed.

(C) Fᴀᴍɪʟʏ sᴛʀᴜᴄᴛᴜʀᴇ: This was coded where 1 = *two adults living together,* whereas other family structures were coded as 0.

(D) Mᴏᴛʜᴇʀ's ᴜsᴇ ᴏғ ᴀʟᴄᴏʜᴏʟ (11 ʏᴇᴀʀs): Mothers reported on their alcohol use with the following response options: 1 = *I don't drink alcohol,* 2 = *less than once a week,* 3 = *at least once a week,* 4 = *1 to 2 glasses each day,* 5 = *3 to 9 glasses each day,* 6 = *at least 10 glasses each day.* Given that there was only one person endorsing Category 6, this was merged with Category 5.

(E) Fᴀᴛʜᴇʀ's ᴜsᴇ ᴏғ ᴀʟᴄᴏʜᴏʟ (11 ʏᴇᴀʀs): Mothers reported on the alcohol use of their partner using the same categories as for their own use. Because there were only two people endorsing category 5 and one endorsing 6, these were merged with category 4.

(F) Vɪsɪᴛɪɴɢ ʀᴇsᴛᴀᴜʀᴀɴᴛs ᴏʀ ᴘᴜʙs (11 ʏᴇᴀʀs): Mothers were asked to report on how often the child visited different places. One of the options was visiting restaurants/pubs, with the following answers: 1 = *more than 5 times/week,* 2 = *2 to 5 times/week,* 3 = *once a week,* 4 = *once a month,* 5 = *several times a year,* 6 = *once or twice a year,* 7 = *never.* The mothers also reported whether they or another adult visited with the child or whether the child visited on his or her own. We opted to use the first option (visiting together) because of low variability in the latter. We merged Options 1, 2, and 3 into a single option, *every week,* and we recoded the answers so that higher numbers reflect more frequent visits.

(G) Mᴀᴛᴇʀɴᴀʟ ᴍᴏɴɪᴛᴏʀɪɴɢ (15 ʏᴇᴀʀs): Mothers were asked a single item, "When your teenager is outside, do you know about his/her whereabouts?" with the following response options: 1 = *I always know,* 2 = *I usually know,* 3 = *I seldom know,* 4 = *I never know.* We recoded the answers so that higher values reflect more knowledge of an adolescent's whereabouts.

(H) Mᴀᴛᴇʀɴᴀʟ ᴄᴏɴғʟɪᴄᴛ (15 ʏᴇᴀʀs): Mothers were asked the following item: "Many parents have troubles with their teenagers, who want to assert their own will. How often do you have these troubles?" with response options 1 = *often,* 2 = *sometimes,* 3 = *seldom,* 4 = *never.* We recoded this item so that higher numbers reflect a higher frequency of conflict.

(I) Pᴇᴇʀ ᴀʟᴄᴏʜᴏʟ ᴜsᴇ (15 ʏᴇᴀʀs): Adolescents reported on different characteristics of their friends, one of them being "getting drunk often," with response options 1 = *yes,* 0 = *no.*

Statistical analysis

First, descriptive statistics of the study variables were computed. The sources of alcohol supply at age 11 were dummy coded with "no one offered me alcohol" as the reference group. Then, we tested bivariate associations of all predictors and the outcomes by regressing the outcomes on each independent variable. The outcomes were modeled as multinomial, comparing the categories "never/no use" to "used more than once/infrequent use," and "never/ no use" to "use often/frequent use." The comparison of the frequency categories (*used more than once* to *use often* and *infrequent use* to *frequent use*) was also carried out and is reported in Appendix A. (Supplemental material appears as an online-only addendum to this article on the journal's website.)

In the next step, two structural equation models were estimated—one for adolescent report of alcohol use and one for pediatrician report—as outcomes (Figure 1). To test our research questions, we first estimated the total effects of mother's and father's alcohol use at age 11 on adolescent alcohol use at age 15 (paths *c1* and *c2*), adjusted for covariates but without sources of alcohol supply. Then, we entered the sources of alcohol supply into the model. Parental supply as a mediator was regressed on parental alcohol use at age 11 (path *a1* for maternal alcohol use and *a2* for paternal alcohol use), changing the labels of the main effects of parental alcohol use in the presence of mediator to *c1′* and *c2′*. Even though parental use of alcohol and the sources of alcohol supply were assessed at the same time point, there is an implicit causal link because parental supply of alcohol stems from the parents' own alcohol use, and it would be hard to imagine reverse causality. The multinomial outcome variables were regressed on parental supply of alcohol (path *b*), along with other types of alcohol supply and all the other covariates. The covariates at age 15 were regressed on age 11 variables. The indirect effect was then computed as *a1* × *b* (for mother) and *a2* × *b* (for father). To assess and compare the relative contribution to the risk of adolescent alcohol use, we computed the population attributable fractions (PAFs) for each source of alcohol supply.[1]

All the models were tested in Mplus 8.0 (Muthén & Muthén, 1998–2017). To provide more robust estimates, bootstrapping with 1,000 resamples was used with the bias-corrected confidence intervals (Bc CI) for assessing the statistical significance of all the inferential estimates. Full information maximum likelihood was used for assessing missing data.

This study was approved by the ethical board at the institution of the primary author of the study. All participants gave informed consent.

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[1]This was computed as $\frac{P_e\,(RR-1)}{1+P_e\,(RR-1)}$ where RR is the relative risk for the exposure and P_e is the exposed proportion of the population.
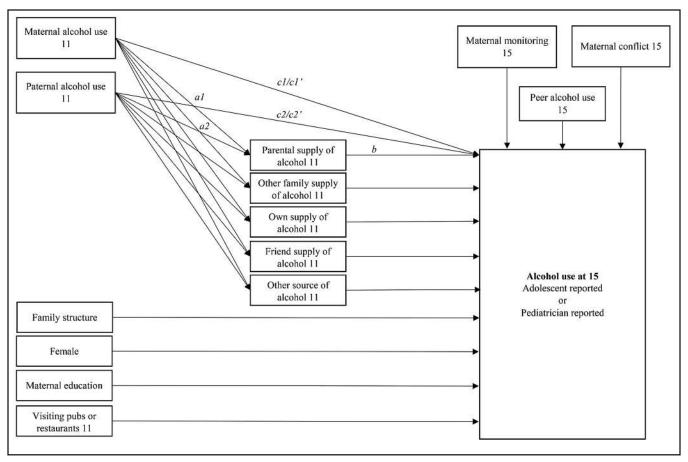
FIGURE 1.   The structural model tested in the current study. *Note:* Maternal and paternal alcohol use at 11, sources of alcohol supply, and maternal monitoring at 15, maternal conflict at 15, and peer alcohol use at 15 were all regressed on background variables (family structure, female, maternal education, visiting pubs/restaurants)—paths not shown. $c1/c2$ = total effect of maternal/paternal alcohol use without the presence of mediators; $c1'/c2'$ = direct effect of maternal/paternal alcohol use with mediators included; $a1/a2$ = effect of maternal/paternal alcohol use on parental supply of alcohol; b = direct effect of parental supply of alcohol on later adolescent alcohol use.

Results

The descriptive characteristics of participants are shown in Table 1. Regarding the outcome variables, 28.2% (n = 361) of 15-year-old adolescents reported never using alcohol or only using it once, whereas 63.7% (n = 815) reported using it more than once, and 8.1% (n = 103) said they used it often. The pediatrician report differed somewhat, as doctors reported that 55.9% (n = 414) of 15-year-old adolescents did not use alcohol, 37.7% (n = 279) reported infrequent use, and 6.4% reported frequent use (n = 47). The adolescent report and the pediatrician report of alcohol use were positively correlated, r = .33, p < .001.

The results from bivariate models are reported as unadjusted odds ratios (ORs) in Table 2 (for adolescent report) and Table 3 (for pediatrician report). They showed that maternal alcohol use was related to higher alcohol use by adolescents for both reporters. Father's alcohol use was also related to higher alcohol use, but only for the adolescent report. Parental supply of alcohol was associated with higher

alcohol use for the less and more frequent type of alcohol use, regardless of the reporter.

Adolescent report

The total effect of mother's alcohol use on adolescent alcohol use in the model with covariates (path $c1$) was significantly higher for adolescents using alcohol more than once (OR = 1.28, 95% Bc CI [1.03, 1.59]). However, the effect was not statistically significant for using it often, OR = 1.40 [0.98, 2.01], in contrast with the unadjusted models. Similarly, the total effect of father's alcohol use (path $c2$) was not significantly related to using alcohol more than once (OR = 1.06 [0.90, 1.25]) or using it often (OR = 1.20 [0.88, 1.65]). Then, sources of alcohol supply were entered into the model. Adjusted effects from the full model are reported in Table 2. Mother's alcohol use was associated with a higher likelihood of supplying children with alcohol (path $a1;$ OR = 1.29 [1.12, 1.53]), and the same was found for paternal alcohol use (path $a2;$ OR = 1.23 [1.05, 1.40]). Importantly,

Table 1. Descriptive statistics of study variables

Age 11 variables	n	%	Valid %	Age 15 variables	n	%	Valid %
Female	1,091	49.5%	49.5%	Maternal monitoring			
Male	1,111	50.5%	50.5%	I never know	6	0.3%	0.4%
Missing	0			I seldom know	85	3.9%	6.3%
				I usually know	887	40.3%	65.6%
Two-parent family	1,887	85.7%	88.3%	I always know	375	17.0%	27.7%
Single-parent family	251	11.4%	11.7%	Missing	849	38.6%	
Missing	0						
				Maternal conflict			
Maternal education		M (SD)		Never	47	2.1%	3.8%
	1,983	12.36 (2.41)		Seldom	464	21.1%	37.2%
Missing	165	7.5%		Sometimes	592	26.9%	47.5%
				Often	144	6.5%	11.5%
Maternal alcohol use				Missing	955	43.4%	
No alcohol	290	13.2%	13.6%				
Less than once a week	1,154	52.4%	54.1%	Friends—often drunk			
At least once a week	574	26.1%	26.9%	Yes	372	16.9%	30.5%
1 to 2 glasses each day	117	5.3%	5.5%	No	847	38.5%	69.5%
Missing	67	3.0%		Missing	983	44.6%	
Paternal alcohol use				Adolescent report of			
No alcohol	139	6.3%	7.3%	alcohol use			
Less than once a week	527	23.9%	27.6%	Never/only once	361	16.4%	28.2%
At least once a week	804	36.5%	42.2%	More than once	815	37.0%	63.7%
1 to 2 glasses each day	386	17.5%	20.3%	Use it often	103	4.7%	8.1%
3 or more glasses each day	50	2.3%	2.6%	Missing	923	41.9%	
Missing	296	13.4%					
				Pediatrician report of alcohol use			
Supply of alcohol				No use	414	18.8%	55.9%
Parents	394	17.9%	17.9%	Infrequent use	279	12.7%	37.7%
Other family member	230	10.4%	10.4%	Frequent use	47	2.1%	6.4%
Own supply	81	3.7%	3.7%	Missing	1,462	66.4%	
Friend	52	2.4%	2.4%				
Other	33	1.5%	1.5%				
None	1,411	64.1%	64.1%				
Missing	0						
Visiting restaurants/pubs							
Never	290	13.2%	14.8%				
Once/twice a year	463	21.0%	23.7%				
Few times a year	784	35.6%	40.1%				
Once a month	354	16.1%	18.1%				
Every week	64	2.9%	3.3%				
Missing	247	11.2%					

Note: Valid % from nonmissing values.

parental supply of alcohol at age 11 led to a higher risk of having used alcohol more than once (OR = 2.07, 95% CI [1.45, 3.19]) and using alcohol often (OR = 2.34 [1.19, 4.44]). Adolescents who were offered alcohol by another family member also reported a higher likelihood of having used alcohol more than once (OR = 2.17 [1.38, 3.63]) and using it often, OR = 2.59 [1.06, 6.23]. Obtaining alcohol on their own was associated with a higher likelihood of using it more than once (OR = 3.38 [1.50, 13.23]) and using it often (OR = 4.96 [1.14, 20.66]). Having a friend who provided adolescents with alcohol at age 11 was not associated with a higher likelihood of using alcohol.

Turning to mediation, significant effects were found for the effect of maternal alcohol use at age 11 through the parental supply of alcohol on the higher likelihood of the adolescent using alcohol more than once (B = 0.19, 95% Bc CI [0.07, 0.41]), as well as using alcohol often (B = 0.22, [0.04,

0.50]). The same findings were found for father's alcohol use at age 11, with the adolescent using it more than once (B = 0.15 [0.04, 0.32]) as well as using alcohol often (B = 0.17, [0.04, 0.43]; Table 2).

Pediatrician report

The total effect of mother's alcohol use (path c1) on the adolescent's alcohol use, adjusted for covariates, was OR = 1.40 [1.09, 1.78] for infrequent use and OR = 1.61 [1.06, 2.44] for frequent use, whereas father's alcohol use was not a significant predictor (OR = 0.77 [0.52, 1.14] for infrequent use, OR = 0.84 [0.69, 1.04] for frequent use). The adjusted effects from the full model are shown in Table 3. Mother's alcohol use was found to be related to a significantly higher likelihood of supplying children with alcohol (path a1; OR = 1.29 [1.12, 1.52]), and the positive association was also

TABLE 2. Unadjusted and adjusted estimates—adolescent report

	More than once vs. never				Often vs. never			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
Variable	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]
Covariates								
Female	1.36	[1.04, 1.73]	1.58	[1.23, 2.09]	1.49	[0.94, 2.38]	1.71	[1.06, 2.59]
Maternal education	1.10	[1.04, 1.16]	1.10	[1.03, 1.17]	1.16	[1.06, 1.27]	1.15	[1.02, 1.28]
Family structure	1.08	[0.71, 1.62]	1.09	[0.69, 1.69]	0.92	[0.47, 1.95]	1.10	[0.50, 2.69]
Visiting pubs/restaurants 11	1.09	[0.96, 1.25]	1.03	[0.90, 1.19]	1.35	[1.08, 1.73]	1.22	[0.90, 1.54]
Maternal alcohol use 11 ($c1'$)	1.43	[1.20, 1.72]	1.25	[0.99, 1.54]	1.87	[1.35, 2.50]	1.36	[0.94, 2.01]
Paternal alcohol use 11 ($c2'$)	1.22	[1.05, 1.42]	1.02	[0.86, 1.21]	1.54	[1.14, 1.98]	1.15	[0.83, 1.60]
Maternal monitoring 15	0.57	[0.45, 0.72]	0.58	[0.45, 0.76]	0.43	[0.30, 0.62]	0.53	[0.34, 0.83]
Maternal conflict 15	1.08	[0.89, 1.28]	0.96	[0.77, 1.15]	1.84	[1.34, 2.50]	1.57	[1.13, 2.17]
Peer alcohol use 15	2.40	[1.78, 3.30]	2.15	[1.57, 3.11]	11.19	[6.48, 17.87]	9.14	[5.32, 16.08]
Sources of alcohol supply								
Parental supply 11 (b)	2.32	[1.63, 3.48]	2.07	[1.45, 3.19]	3.12	[1.69, 5.60]	2.34	[1.19, 4.44]
Other family supply 11	2.02	[1.28, 3.36]	2.17	[1.38, 3.63]	2.52	[1.09, 5.23]	2.59	[1.06, 6.23]
Own supply 11	3.51	[1.48, 10.49]	3.38	[1.50, 13.23]	6.12	[1.63, 22.72]	4.96	[1.14, 20.66]
Friend supply 11	1.80	[0.81, 7.01]	1.73	[0.68, 5.70]	3.50	[0.58, 16.21]	3.46	[0.00, 13.95]
Other supply 11	1.42	[0.51, 9.28]	1.26	[0.37, 7.12]	2.62	[0.00, 29.12]	1.89	[0.00, 20.50]

			Parental supply				Parental supply	
Predicting parental supply			OR	[95% CI]			OR	[95% CI]
Maternal alcohol use 11 ($a1$)			1.29	[1.12, 1.53]			1.29	[1.12, 1.53]
Paternal alcohol use 11 ($a2$)			1.23	[1.05, 1.40]			1.23	[1.05, 1.40]

Indirect effect	B	[95% Bc CI]					B	[95% Bc CI]
Maternal alcohol use 11	0.19	[0.07, 0.41]					0.22	[0.04, 0.50]
Paternal alcohol use 11	0.15	[0.04, 0.32]					0.17	[0.04, 0.43]

Notes: OR = odds ratio; CI = confidence interval; Bc CI = bias-corrected confidence interval; unadjusted estimates = bivariate estimates; adjusted estimates = estimates from the full model including all variables shown in Figure 1; 11 = measured at age 11; $a1/a2$ = reflect the *a* paths (maternal/paternal alcohol use 11 → parental supply of alcohol 11); *b* = reflects the *b* path (parental supply of alcohol 11 → adolescent/pediatrician report of alcohol users); $c1'/c2'$ = reflect the $c1'/c2'$ path (maternal/paternal alcohol use 11 → adolescent/pediatrician report of alcohol use with mediators included); indirect effect = reflects the indirect effect of maternal/paternal alcohol use 11 → parental supply of alcohol 11 → adolescent/pediatrician report of alcohol use.

found for father's alcohol use (path *a2;* OR = 1.22 [1.05, 1.40]). The parental supply of alcohol was associated with a higher likelihood of infrequent (OR = 1.62 [1.02, 2.34]) as well as frequent use (OR = 2.37 [1.02, 5.47]). No other source of alcohol supply emerged as significant, as per the pediatrician report.

Testing of mediation found that mother's alcohol use led to a significantly higher likelihood of the adolescent using alcohol infrequently through parental supply, $B = 0.12$ [0.02, 0.29], and using it frequently, $B = 0.22$ [0.03, 0.54]. The indirect effect was also found to be significant for father's alcohol use, infrequent use: $B = 0.10$ [0.01, 0.24], and frequent use: $B = 0.17$ [0.02, 0.46].

The PAFs to compare the contributions of different sources of alcohol supply are shown in Table 4. They suggest that, because of high prevalence in this sample (~18%) as well as consistently increased risk for later alcohol use, parental supply of alcohol emerged as the major contributor to frequent use at age 15, with a PAF of 0.04 and 0.05 for less frequent use (adolescent and pediatrician report) and 0.12/0.15 for frequent use. Supply of alcohol from another family member was also considerable, with a PAF between 0.01 and 0.04 for the adolescent report and between 0.01 and 0.06 for the pediatrician report. Obtaining alcohol on one's own was also

important, but only for adolescent self-reports (0.01 and 0.04). Friend-provided alcohol had a PAF of 0.02 for adolescent- and 0.04 for pediatrician-reported frequent use.

Supplementary analyses

The comparison of the frequency categories (*used more than once* to *use often* and *infrequent use* to *frequent use*) was carried out as a supplementary analysis with results reported in Appendix A. It showed that, with the exception of maternal conflict and peer use for the adolescent report and maternal monitoring for the pediatrician report, none of the covariates were able to distinguish between the frequency categories, suggesting that the main predictive power of the age 11 covariates was when comparing nondrinkers to drinkers at age 15. Neither of the indirect effects (of maternal/paternal alcohol use on the adolescent/pediatrician report) were statistically significant.

Sensitivity analyses. Given the high data attrition at age 15, especially for the pediatrician report, we carried out sensitivity analyses to see whether estimating the missing data for the outcome variables did not bias the results. More information and the full results from the multinomial models are reported in Appendix B. They showed that the main

TABLE 3. Unadjusted and adjusted estimates—pediatrician report

| | Infrequent use vs. no use | | | | Frequent use vs. no use | | | |
| | Unadjusted | | Adjusted | | Unadjusted | | Adjusted | |
Variable	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]
Covariates								
Female	1.44	[1.08, 2.01]	1.53	[1.09, 2.10]	1.16	[0.64, 2.13]	1.19	[0.60, 2.41]
Maternal education	0.98	[0.92, 1.05]	0.95	[0.87, 1.03]	0.99	[0.87, 1.13]	0.94	[0.33, 5.76]
Family structure	0.61	[0.37, 1.02]	0.60	[0.35, 1.04]	0.98	[0.38, 4.69]	0.97	[0.82, 1.14]
Visiting pubs/restaurants 11	1.05	[0.89, 1.25]	1.04	[0.87, 1.23]	1.22	[0.94, 1.70]	1.23	[0.89, 1.71]
Maternal alcohol use 11 ($c1'$)	1.25	[1.01, 1.54]	1.37	[1.04, 1.75]	1.48	[1.08, 2.06]	1.59	[0.98, 2.42]
Paternal alcohol use 11 ($c2'$)	0.95	[0.78, 1.14]	0.83	[0.65, 1.03]	0.99	[0.70, 1.30]	0.77	[0.51, 1.21]
Maternal monitoring 15	0.63	[0.44, 0.84]	0.64	[0.45, 0.88]	0.24	[0.13, 0.41]	0.25	[0.13, 0.46]
Maternal conflict 15	1.22	[0.97, 1.52]	1.11	[0.87, 1.46]	1.73	[1.06, 2.87]	1.39	[0.86, 2.35]
Peer alcohol use 15	1.21	[0.80, 1.76]	1.14	[0.77, 1.72]	2.65	[1.46, 4.91]	2.19	[0.99, 4.45]
Sources of alcohol supply								
Parental supply 11 (b)	1.61	[1.10, 2.34]	1.62	[1.02, 2.34]	2.57	[1.19, 4.85]	2.37	[1.02, 5.47]
Other family supply 11	1.39	[0.79, 2.26]	1.34	[0.80, 2.43]	2.50	[0.88, 5.93]	2.02	[0.49, 5.51]
Own supply 11	1.30	[0.58, 3.11]	1.26	[0.50, 2.95]	0.88	[0.00, 4.42]	0.85	[0.00, 5.43]
Friend supply 11	2.22	[0.80, 6.25]	2.33	[0.75, 6.65]	4.95	[0.00, 23.05]	5.74	[0.00, 24.47]
Other supply 11	2.39	[0.47, 17.30]	*		*	*	*	

| | | | Parental supply | | | | Parental supply | |
Predicting parental supply			OR	[95% CI]			OR	[95% CI]
Maternal alcohol use 11 ($a1$)			1.29	[1.12, 1.52]			1.29	[1.12, 1.52]
Paternal alcohol use 11 ($a2$)			1.22	[1.05, 1.40]			1.22	[1.05, 1.40]

Indirect effect	B	[95% Bc CI]					B	[95% Bc CI]
Maternal alcohol use 11	0.12	[0.02, 0.29]					0.22	[0.03, 0.54]
Paternal alcohol use 11	0.10	[0.01, 0.24]					0.17	[0.02, 0.46]

Notes: OR = odds ratio; CI = confidence interval; Bc CI = bias-corrected confidence interval; unadjusted estimates = bivariate estimates; adjusted estimates = estimates from the full model including all variables shown in Figure 1; 11 = measured at the age of 11; *Because of low cross-tabulation value, the effect of the dummy code was removed; $a1/a2$ = reflect the a paths (maternal/paternal alcohol use 11 → parental supply of alcohol 11); b = reflects the b path (parental supply of alcohol 11 → adolescent/pediatrician report of alcohol users); $c1'/c2'$ = reflect the $c1'/c2'$ path (maternal/paternal alcohol use 11 → adolescent/ pediatrician report of alcohol use with mediators included); indirect effect = reflects the indirect effect of maternal/paternal alcohol use 11 → parental supply of alcohol 11 → adolescent/pediatrician report of alcohol use.

findings of the study remained virtually unchanged, with the exception of not finding a statistically significant effect for the pediatrician report for parental supply comparing never versus frequent use (2.39 [0.96, 5.03]), most likely because of the limited statistical power for carrying out this comparison. The mediated effect of mother's alcohol use was not significant for the pediatrician report but remained significant for the adolescent report.

Discussion

This study used a longitudinal sample of Czech adolescents to assess whether parental supply of alcohol was associated with subsequent alcohol use among adolescents. Our goal was to test whether this association—previously observed in studies from North America, Australia, and Western Europe—would still be relevant in an alcohol-permissive setting of the Czech Republic. To the best of our knowledge, no other study has examined parental supply of alcohol to adolescents in countries of Central and Eastern Europe.

The children who reported having been exposed to alcohol by their parents at age 11 showed higher levels of alcohol drinking at age 15, as indicated by both their self-reports and their pediatricians' reports. These findings were observed even when parental drinking and other sources of alcohol supply were controlled for in the analyses. Furthermore, the robustness of the findings was supported by the use of multiple reporters. The main findings converged, even though adolescents reported on their lifetime alcohol use whereas pediatrician reports referred to alcohol use in the past month. Being exposed to alcohol by parents mediated the association between parental and adolescent drinking.

Parental alcohol supply emerged as the predictor with the most robust effect, being consistently associated with a higher likelihood of using alcohol more often, regardless of the reporter. Among other sources of alcohol supply, being offered alcohol by other family members was associated with a significantly higher likelihood of drinking at age 15, but only when reported by adolescents. An important source outside of the family context was observed for own supply of alcohol, albeit only for self-reports. In this sense, finding alcohol on one's own indicates substantial risk factors for later alcohol use, yet its prevalence at age 11 was very low.

Friend supply of alcohol did not emerge as a significant predictor, seemingly in contrast to existing studies that found strong peer effects on alcohol drinking (Boyd et al., 2018;

TABLE 4.   Population attributable fraction for alcohol use at age 15 for different sources of alcohol supply

Variable	Adolescent report		Pediatrician report	
	More than once vs. never	Often vs. never	Infrequent use vs. no use	Frequent use vs. no use
Parents	0.04	0.12	0.05	0.15
Other family member	0.01	0.04	0.01	0.06
Own supply	0.01	0.04	0.002	[a]
Friend	0.002	0.02	0.01	0.04
Other	0.00	0.01	0.01	[a]

[a]Not estimated.

Schuler et al., 2019), including alcohol supply (Lam et al., 2020). However, the friend supply of alcohol was assessed at age 11, too early for most participants to be interested in or able to obtain alcohol from their friends (only 2% reported having had alcohol offered by a friend). At this early age, it is the parents or other family members who in most cases provide the "gateway" to the first experience with alcohol. The peer effects on alcohol use become particularly salient during middle adolescence (Burk et al., 2012; Windle, 2000), which was confirmed in our study, as socializing with peers who often get drunk at age 15 was associated with higher odds of adolescent drinking.

The current findings corroborate the results of previous studies (Colder et al., 2018; Komro et al., 2007; Mattick et al., 2018; Sharmin et al., 2017). Importantly, they extend these findings into a non-Western context and show that the association holds even in arguably one of the most alcohol-permissive contexts. Some authors have hypothesized that drinking supervised by parents may result in greater risks in countries adopting a zero-tolerance policy toward adolescent drinking than in countries encouraging responsible drinking as it deviates from the commonly accepted norm (McMorris et al., 2011). However, our results do not support the hypothesis that parental supply of alcohol might be a risk factor for adolescent drinking only in restrictive contexts, confirming the findings of previous cross-cultural comparisons (Chan et al., 2017; McMorris et al., 2011).

Strikingly, 35.4% of 11-year-old children in our sample reported previous experience with alcohol, of whom 17.8% reported alcohol being provided by parents and 10.1% by another family member. For comparison, the lifetime prevalence of alcohol experience by age 11 ranged between 9.0% and 10.6 %, based on data from 11 U.S. national and statewide surveys (Donovan, 2007). The prevalence of early experience with alcohol appears to be higher in the European Union—33%. However, that prevalence was assessed among 13-year-olds, an age at which in the Czech Republic the lifetime prevalence of alcohol experience reaches 42% (ESPAD Group, 2020).

Our finding that exposure to alcohol by parents mediated the association between parental and adolescent drinking is consistent with the hypothesized role of family norm setting related to alcohol in predicting adolescent alcohol use (Nash et al., 2005; van der Vorst et al., 2006; Van Zundert et al., 2006). Parents who regularly consume alcohol may consider this behavior normative and thus may be more likely to offer alcohol to their underage children. Oei and Morawska (2004) argued that beliefs about alcohol and perceptions about how others use alcohol drive adolescent drinking behavior. In this sense, providing alcohol to adolescents may convey a message that underage drinking is acceptable and may reinforce adolescents' decision to drink. Thus, offering alcohol to adolescents may increase their comfort with drinking and unintentionally increase their alcohol consumption (Kaynak et al., 2014). This finding aligns with the general attitude toward alcohol within the Czech context, characterized by a permissive attitude toward drinking, including among adolescents (Dzúrová et al., 2010; Hodačová et al., 2017). Parental supply of alcohol might thus be one of the factors that adds to this situation by normalizing alcohol use (Chan et al., 2017).

These results offer important impetus for preventive efforts by emphasizing the role of family context in affecting adolescent alcohol use. The findings show that parental alcohol drinking is positively associated with offering alcohol to their underage children, which in turn leads to a higher risk of drinking alcohol later in adolescence. In this way, the preventive efforts would not only focus on adolescents but should also target the often too nonchalant parental attitude toward underage alcohol use. Based on the present as well as existing results from Western countries, such prevention efforts might (a) focus on dispelling the prevailing myth of safe introduction to alcohol and better progression when done within a family (Wadolowski et al., 2016); and (b) emphasize that parental drinking in the presence of their children contributes to the normalization of alcohol's presence in everyday life. Such intervention would teach parents to be more mindful when it comes to drinking and serving alcohol at home and to try to postpone the age when children are served alcohol at home.

Preventive efforts can also be made at the community and policy level. For example, there was a large decrease in the prevalence of parental supply of alcohol in Australia between 2004 and 2013 that may be partially attributable to legislative changes limiting adolescents' access to alcohol (Kelly et al., 2016).

Strengths and limitations

Among the main strengths of the study is the use of multiple reporters, including mothers, adolescents, and pediatricians. In this way, it partially alleviated the common method bias and provided more support for the external validity of the observed associations. The nature of the data allowed us to model the longitudinal effect of alcohol supply on later adolescent alcohol use while controlling for multiple covariates, providing support for a causal path, in which parental levels of drinking increase the likelihood of providing alcohol to their children, which leads to higher use of alcohol in mid-adolescence.

This study also includes several limitations. First, we were unable to distinguish the supply of whole drinks from just having a sip of alcohol, where the former would arguably be a more serious type of alcohol engagement. Although parental alcohol supply was consistently linked to subsequent adolescent alcohol use regardless of its operationalization (Sharmin et al., 2017), previous studies suggested that this link may be stronger when whole drinks were offered, as compared with sips (Aiken et al., 2020). Thus, it is possible that the strength of the found association would be altered if we had been able to distinguish between whole drinks and sips. Relatedly, adolescents were forced to select only a single source of alcohol supply. It is possible that children might have been offered alcohol from multiple sources, but this information was not assessed.

Another limitation is that we did not have information about the context of parental alcohol supply, that is, whether alcohol was provided by parents directly (whether they directly poured their children a glass of alcohol) or whether parents simply allowed their children to drink alcohol under their supervision. Previous studies have found that indirect parental influences (e.g., parental allowance of drinking at home) have been associated with a higher risk of problematic drinking among adolescents (Kaynak et al., 2014; Sharmin et al., 2017).

The majority of the existing studies on direct parental influences also showed a higher risk of later alcohol drinking, yet there have been some cross-sectional studies that have shown that direct parental supply of alcohol was associated with lower risk (see Kaynak et al., 2014, for a review). The wording of the item used in this study seems to reflect direct parental influence, but, without additional items referring to the contextual factors of parental alcohol supply, it is unclear what was the most usual setting in which the adolescents were offered alcohol and whether the type of setting might have affected the hypothesized association.

Regarding adolescent alcohol use, we could not assess the severity of drinking (such as heavy or binge drinking), only the frequency aspect. In addition, alcohol use was evaluated by a single item for both adolescents and pediatricians, providing a rather rough approximation of use. Finally, there was substantial attrition from the original sample size, especially for the pediatrician reports. For this reason, we carried out sensitivity analyses, which showed that the results were not different when only individuals with valid data on both time points were selected.

Conclusions

This study tested whether parental supply of alcohol to their children at age 11 would lead to higher alcohol use at age 15 in a cultural context characterized by a high level of permissiveness toward alcohol. The results showed that parental supply of alcohol led to a higher likelihood of using alcohol 4 years later, as reported by both the adolescents and their pediatricians. Parental supply of alcohol also mediated the effect of parental alcohol use on their children's alcohol use. These findings suggest that the link between parental supply of alcohol and harmful drinking by adolescents might be universal and not related to specific alcohol cultural norms.

Conflict-of-Interest Statement

The authors declare that they have no competing interests.

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